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Taxonomic study of *Targalla delatrix* (Guenée) and its close relatives from East and Southeast Asia with description of a new species (Lepidoptera: Euteliidae)

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Abstract *Targalla delatrix* (Guenée) and its close relatives from East and Southeast Asia are revised. A new species, *T. silvicola* sp. nov. is described from China, Vietnam, Laos, Taiwan and Japan. *T. subocellata pantarcha* Turner is recognized here as a good species distinct from *T. subocellata* (Walker) and is treated as *T. pantarcha* (Turner) stat. rev. Additionally, *T. infida* Walker sp. rev. is treated here as a distinct species from *T. palliatrix* (Guenée). In addition, using the DNA barcoding data of mitochondrial DNA (*COI*) genes, together with the *Targalla* data already registered in GenBank, we can distinguish seven *Targalla* species successfully and an NJ-tree is given.

Key words DNA barcoding, genitalia, morphology of vesica, *mtCOI*, *Targalla silvicola* sp. nov., wing maculation.

Introduction

The genus *Targalla* comprises 20 species and one subspecies which are mainly distributed from the tropical to subtropical Indo-Australian regions (Holloway, 1985; Poole, 1989). The genus *Targalla* Walker was revived from synonymy with *Phlegetonia* Guenée by Holloway (1985). Although Holloway (1985) revised the Asian fauna of this group focusing on Borneo Island, *Targalla* species distributed in other East and Southeast Asian countries such as China, Vietnam, Laos, Taiwan, Japan and so on have not been sufficiently studied. Additionally, there are two distinct species of *Targalla* in Japan, but they have not hitherto been distinguished and were treated as a single species, *Targalla delatrix* in Kishida (2011), because of the taxonomic problems mentioned by him. Therefore, we studied the *Targalla* species from these regions, focusing especially on "typical *Targalla*" *sensu* Holloway (1985). As the members of this group have very similar wing markings and very variable coloration of forewings, the identification of the species is not easy. Although we treat eight species from East and Southeast Asia in the following lines, photographs of the type specimens of three species endemic to Sri Lanka and/or India in South Asia are illustrated for reference. Those are *T. bifacies* (Walker), *T. ludatrix* (Walker) and *T. repleta* (Walker). We also consider that *T. ludatrix* apparently represents a good species on the basis of the male and female genitalia illustrated by Holloway (1985). Following Holloway (1985), we also treat *T. bifacies* and *T. repleta* as two distinct species.

The genus *Targalla* involves some pests of Myrtaceae and Meliaceae. The Eugenia caterpillar, *Targalla delatrix* (Guenée), distributed from South East Asia, parts of Australia to some Pacific Islands has been known as a pest of *Eugenia aquea*, *E. jambos*, *Sandoricum koetjape*, etc. (Kuroko and Lewvanich, 1993; Robinson *et al*., 2001). However, we consider that the previous

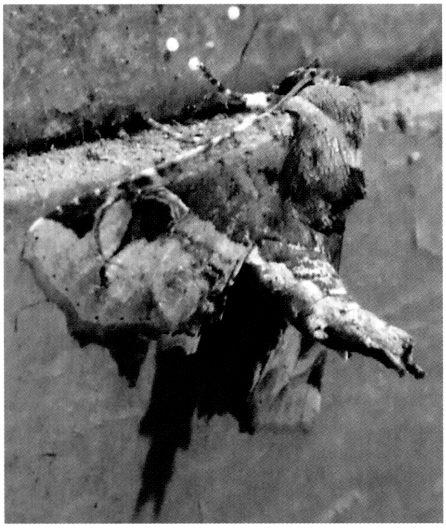

Fig. 1. Resting posture of a male adult of *Targalla subocellata* (Walker). Photo by D. Watabiki at North Vietnam in 2012.

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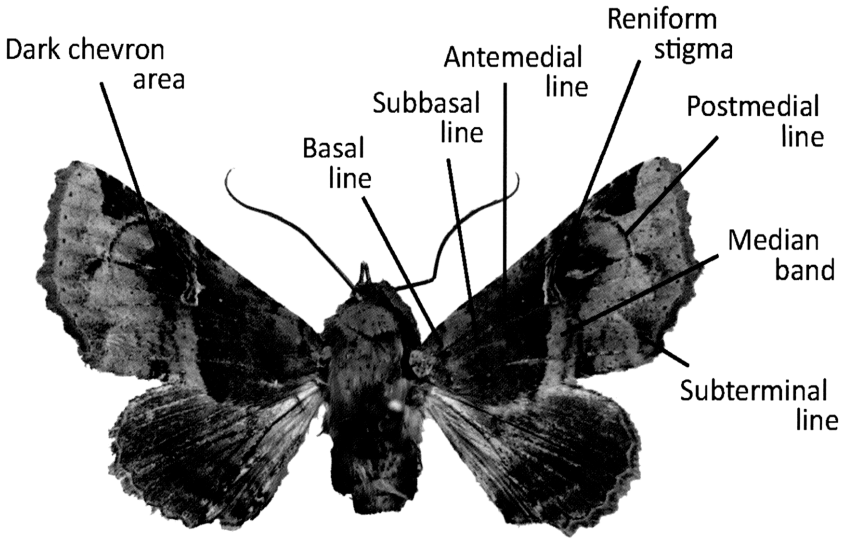

Fig. 2. Terminology of wing pattern used in this paper (*Targalla subocellata* (Walker)).

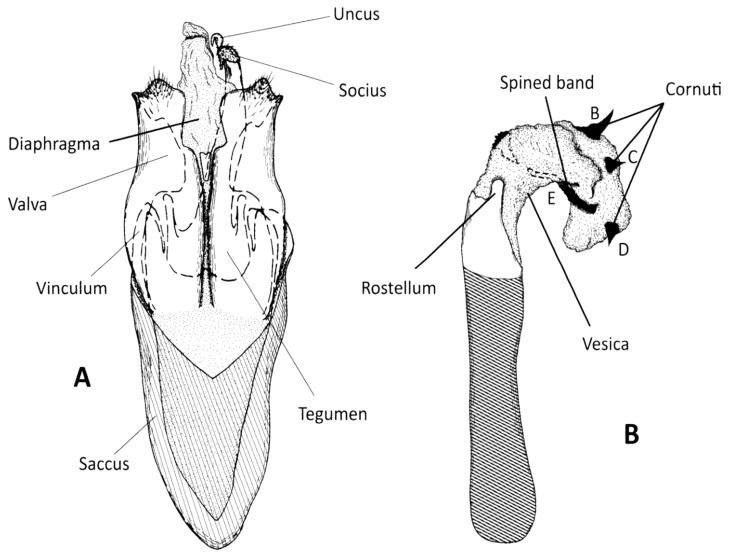

Fig. 3. Terminology of male genitalia used in this paper (*Targalla subocellata* (Walker)). A: valvae +saccus in ventral view. B: aedeagus in right lateral view, vesica everted.

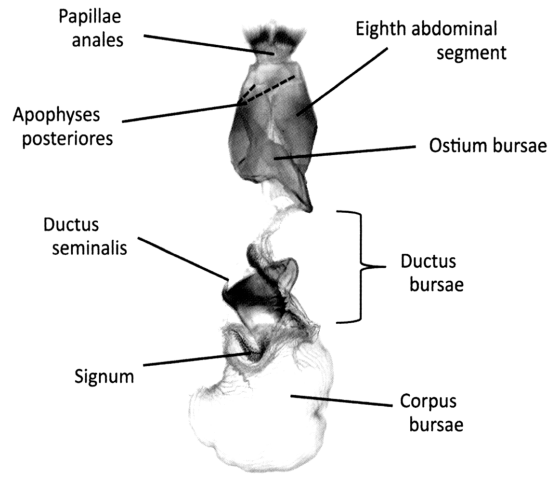

Fig. 4. Terminology of female genitalia used in this paper (*Targalla palliatrix* (Guenée)) in ventral view.

host records of the genus *Targalla* should be carefully checked, because the identification of the adults and larvae is difficult.

The higher classification of the Noctuidae was historically reviewed by Kitching (1984). However, as mentioned in Mitchell *et al*. (2006) "Recent authors have begun to propose phylogeny-based alternatives to Hampson's system, but the comprehensive data matrices, daunting to assemble are still lacking. In the meanwhile, molecular studies, which offer an abundance of new characters and which, with expert guidance on exemplar selection, may be easier to carry out than comparable analysis of morphological variation, have begun to test and extend many of these proposals" Using the sequence data from seven nuclear regions and one mitochondrial gene region, Zahiri *et al*. (2011) proposed a phylogenetic

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hypothesis of the superfamily Noctuoidea. Their study revealed that the monophyly of Noctuoidea is strongly supported, within which they found six strongly supported clades that they feel deserve family status. These are Oenosandridae, Notodontidae, Erebidae, Nolidae, Euteliidae and Noctuidae. Although Kishida (2011) treated Euteliinae as one of the subfamilies of Noctuidae, in this paper we use the family name Euteliidae instead of the subfamily name Euteliinae of the family Noctuidae following the treatment of Zahiri *et al.* (2011). The same treatment was used by Pogue (2013). The cryptic resting posture of adult euteliid (Fig. 1) is especially unusual as Holloway (1985) mentioned.

Materials and methods

Morphological studies

The present study is based mainly on about 250 adult specimens collected from the Indo-Australian region. Male and female genitalia were dissected and observed in a petri dish soaked with 70-80 % ethanol under a microscope, Leica M 50. Holding the aedeagus by a forceps held in the left hand under the microscope, the vesica inside the aedeagus was pulled out gradually without breaking the cornuti on the vesica and the vesica itself by a forceps held in the right hand. Most of the type specimen images used in this paper were taken by Dr T. Osawa of the National Institute for Agro-Environmental Sciences, Tsukuba with the help of Messrs M. Honey and G. Martin of the Natural History Museum, London. Additionally, a type image of *T. pantarcha* was taken by Mr You Ning Su of the Commonwealth Scientific and Industrial Research Organisation, Canberra. We used the photos with the permission of the Natural History Museum, London and the Commonwealth Scientific and Industrial Research Organisation, Canberra.

DNA experiments

Targalla adults of 16 examples collected from China in 2009 and 2011, Laos in 2013, Vietnam in 2012 and 2013, Philippines in 2010 and Japan in 2005 were used. The euteliid species, *Penicillaria jocosatrix* Guenée and *Targallodes vittalba* (Semper) collected by us in Laos in 2013 at light trap were also utilized as outgroup species. Three right or left side legs of specimens were removed and one leg was put into 99.5% ethanol for subsequent DNA extraction; DNA was extracted using a DNeasy Blood & Tissue Kit (Qiagen, Hilden, Germany). Usually the remaining two legs were kept in a freezer at −30°C using a 99.5% ethanol soaked tube for further study of other regions of DNA. The leg was homogenized in 200μl ATL-Buffer with 20μl proteinase K and incubated at 55°C over one hour. After incubation, total genomic DNA was extracted following the manufacture's instructions. A DNA fragment of the mitochondrial cytochrome oxidase subunit I (*COI*) gene was amplified using the polymerase chain reaction (PCR) with the primers LCO1490: (5'-GGTCAACAAATCA TAAAGATTGG-3') and HCO2198: (5'-TAAACTT CAGGGTGACCAAAAAATCA-3') (Folmer *et al.*, 1994). PCR cycling condition were 94°C for 5 min, 35 cycles of 94°C for 30 sec, 47°C for 30 sec (AB915675-AB915679, AB915684, AB915685, AB9 15689, AB915691, AB915692) or 46°C for 30 sec (AB915680-683, AB915686-AB915688, AB915690) and 72°C for 1 min with final extension at 72.0°C for 5 min. PCR was preformed in a reaction volume of 40μl using 3.2μl of each primer (10 μmol/l), 20μl of GoTaq (Promega), 1.6μl of template DNA and 12μl of SDW. We asked Takara Bio Inc. to do the analysis of nucleotide sequences by direct sequencing using a Big Dye Terminator v3.1 Cycle sequencing kit (Applied Biosystems) and an ABI 3730-XL genetic analyzer (Applied Biosystems, Foster City, CA, USA). Sequences were edited with sequence assembly software ATGC (Genetyx, Japan) and we used MEGA5 software (Tamura *et al.*, 2011) to align nucleotide sequencing and to construct a neighbor-joining (NJ; Saitou and Nei, 1987) tree using p-distance. To estimate the confidence probability for each interior branch, the bootstrap method (Felsenstein, 1985) was performed with 1,000 replications. We used DNAsp v5 (Librado and Rozas, 2009) to search for sequence divergence among them.

Material depositories and those abbreviations

Collection abbreviations are as follows: (CSIRO) Commonwealth Scientific and Industrial Research Organisation, Canberra. (NHM) Natural History Museum, London. (KMNH) Kitakyushu Museum of Natural History and Human History, Kitakyushu. (NIAES) National Institute for Agro-Environmental Sciences, Tsukuba. (NSMT) National Museum of Nature and Science, Tsukuba. (OPU) Osaka Prefecture University, Osaka. (OUMNH) Oxford University Museum of Natural History, Oxford. (TMC) Takehiko Masui's personal collection, Takamatsu, Kagawa.

Holotype and some paratypes of the new species described here will be deposited in NIAES, Tsukuba and some paratypes in NSMT, Tsukuba and in TMC, Kagawa.

Terminology

The terminology of adult structures used in this paper follows Holloway (1985), Tuxen (1956), Kononenko and Pinratana (2005) and Ueda (1984). The terminology used

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in this paper is shown in Figs 2, 3 and 4.

Results and Discussion

Genus *Targalla* Walker

Targalla Walker, [1858] 1857: 1008.
Cryassa Walker, 1858: 1745.
Euteliella Roepke, 1938: 17.

Diagnosis

A marked flexing of the tegumen in the male genitalia is characteristic of the genus *Targalla* and the tegumen has a rod-shaped central process with a small uncus at the tip. The uncus is a hook-like process except in the *Euteliella* group *sensu* Holloway (1985) where the hook is absent. The vinculum is represented by a weakly sclerotized, small ribbon-shaped plate. The saccus is long, usually relatively broad. The eighth sternite of the male bears a pair of eversible coremata. The antennae are smooth and filiform in both sexes besides *T. apicifascia* (Hampson) and *T. barbara* (Robinson) where they are weakly bipectinate in the male. The apophyses anteriores are absent or fused with the ductus bursae. The eighth abdominal tergite is elongated ventrally and fused with the ostium bursae.

Descriptions of species

Targalla atripars (Hampson, 1912) (Figs 5, 6, 33, 34, 53)

Phlegetonia atripars Hampson, 1912: 84. Type locality: Java, Indonesia.
Targalla atripars: Holloway, 1985: 193; Chen, 1999: 940, pl. 42: 45.

Male (Fig. 5). Forewing length 15.7-16.1 mm. Head: labial palpi reddish brown with black scales and speckled with white; frons reddish brown on dorsal half and white on ventral half; vertex densely covered with reddish brown scales; antenna filiform. Thorax: tegulae ocherous tinged with slightly reddish brown; fore-legs usually brownish black with creamy white band on marginal end of each segments of tarsus, mid- and hind-legs white mixed with black and reddish brown scales. Abdomen: creamy brown with brownish black 2nd to 5th or 6th dorsal area, creamy brown ventrally. Forewing: distal half creamy brown; basal half blackish brown; subbasal and antemedial line usually blackish brown and inner area of subbasal line creamy brown often tinged with brown; orbicular spot very small, and white; reniform stigma large, rounded, brown, defined by yellowish white, slightly distorted on the outer side; median band yellowish white sometimes tinged with pink, oblique and slightly curved; postmedial line blackish brown and inconspicuous; subterminal line curved along outer margin with a dark brown triangular shade subapically; a series of inconspicuous black dots on interspaces of veins marginally; cilia brown. Hindwing: uniformly dark brown, cinereous-white at the base; cilia brown, sometimes mixed with reddish brown.

Female (Fig. 6). Forewing length and wing maculation same as male.

Male genitalia (Figs 33, 34). Uncus very small, hooked, sharply flexed; socius rectangular plate-like, spinules absent. Tegumen rather thick, smooth, strongly curved in lateral view, with a very long rod-like process at middle part accompanying by uncus at apex; vinculum represented by a distorted, tape-like sclerite; saccus very long and longer than valva. Valva rectangular with a strongly produced right angle corner at the outside apex. Aedeagus short and thick; rostellum elongate with sharp apex; vesica multilobed, bearing three slender cornuti and some sclerotized plates.

Female genitalia (Fig. 53). Apophyses posteriores weakly sclerotized, moderate in length. Ostium bursae symmetrically sclerotized and remarkably tapering toward ductus bursae in ventral. Ductus bursae narrow, membranous on posterior half and bulging, sclerotized, densely covered with small spines over the entire surface on anterior half. Corpus bursae rounded; signum scobinate and slightly curved inside.

Specimens examined. [MALAYSIA] 1♂1♀, Sabah, Mt. Kinabalu, Kundasang, 1,000m, 3-18. V. 1980, T. Hasegawa leg. (NIAES); 1♂1♀, Sabah, Mamut, 1,500m, 25.V. - 4.VI. 1980, T. Hasegawa leg. (NIAES); [INDONESIA] 1♀, Bali west, Kec mendoyo, 100-300m, II. 1991 (NIAES).

Distribution. CHINA, S. E. Asia to the Solomon Isles.

Diagnosis and Remarks. This is the largest species in the *delatrix* group.

Targalla delatrix (Guenée, 1852) (Figs 7, 8, 35, 36, 54)

[Japanese name: Neguro-fusayaga]

Penicillaria delatrix Guenée, 1852: 304. Type locality: Java, Indonesia.
Eutelia plusioides Walker, 1865: 822.
Eurhipia praetexta Felder and Rogenhofer, 1874: 10, pl. 111, Fig. 24.
Eutelia delatrix: Hampson, 1894: 391.
Phlegetonia delatrix: Hampson, 1912: 84.
Targalla delatrix: Swinhoe, 1888: 337; Swinhoe, 1890: 85; Holloway, 1985: 190.

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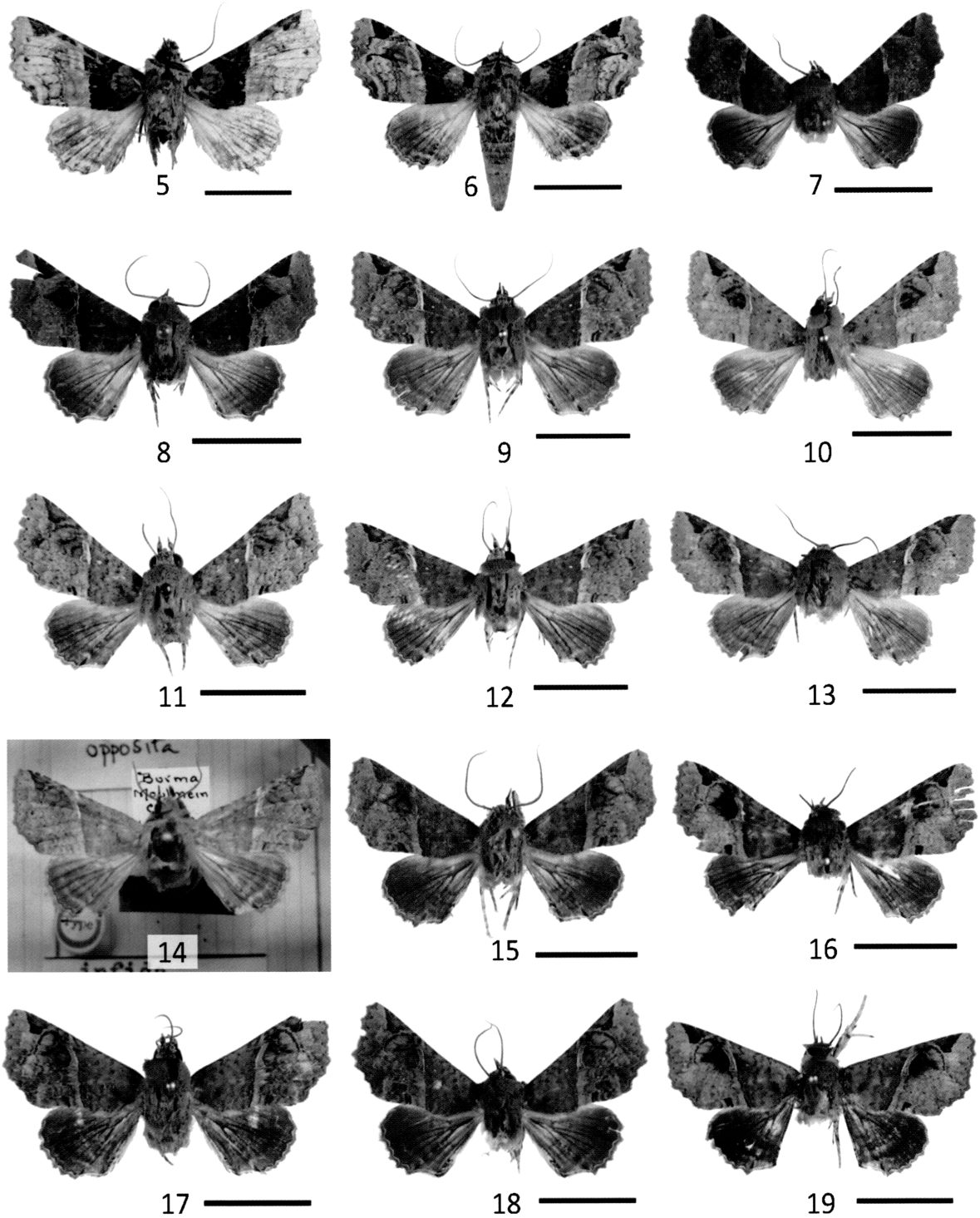

Figs 5-19. Adults of *Targalla* spp.

5: *T. atripars* (Hampson), ♂. 6: Ditto, ♀. 7: *T. delatrix* (Guenée), ♂. 8: Ditto, ♀. 9: *T. palliatrix* (Guenée), ♂. 10: Ditto, ♀. 11: *T. infida* Walker, sp. rev., ♂. 12: Ditto, ♂. 13: Ditto, ♀. 14: Ditto, holotype, ♂. 15: *T. sugii* Holloway, ♂. 16: Ditto, ♀, [AB915682]. 17: *T. silvicola* sp. nov., holotype, ♂, [AB915685]. 18: Ditto, paratype, ♂. 19: Ditto, paratype, ♀, [AB915684]. *14: © Natural History Museum Collection, NHM. Scale bars = 10mm. GenBank Accession numbers are given in the parentheses.

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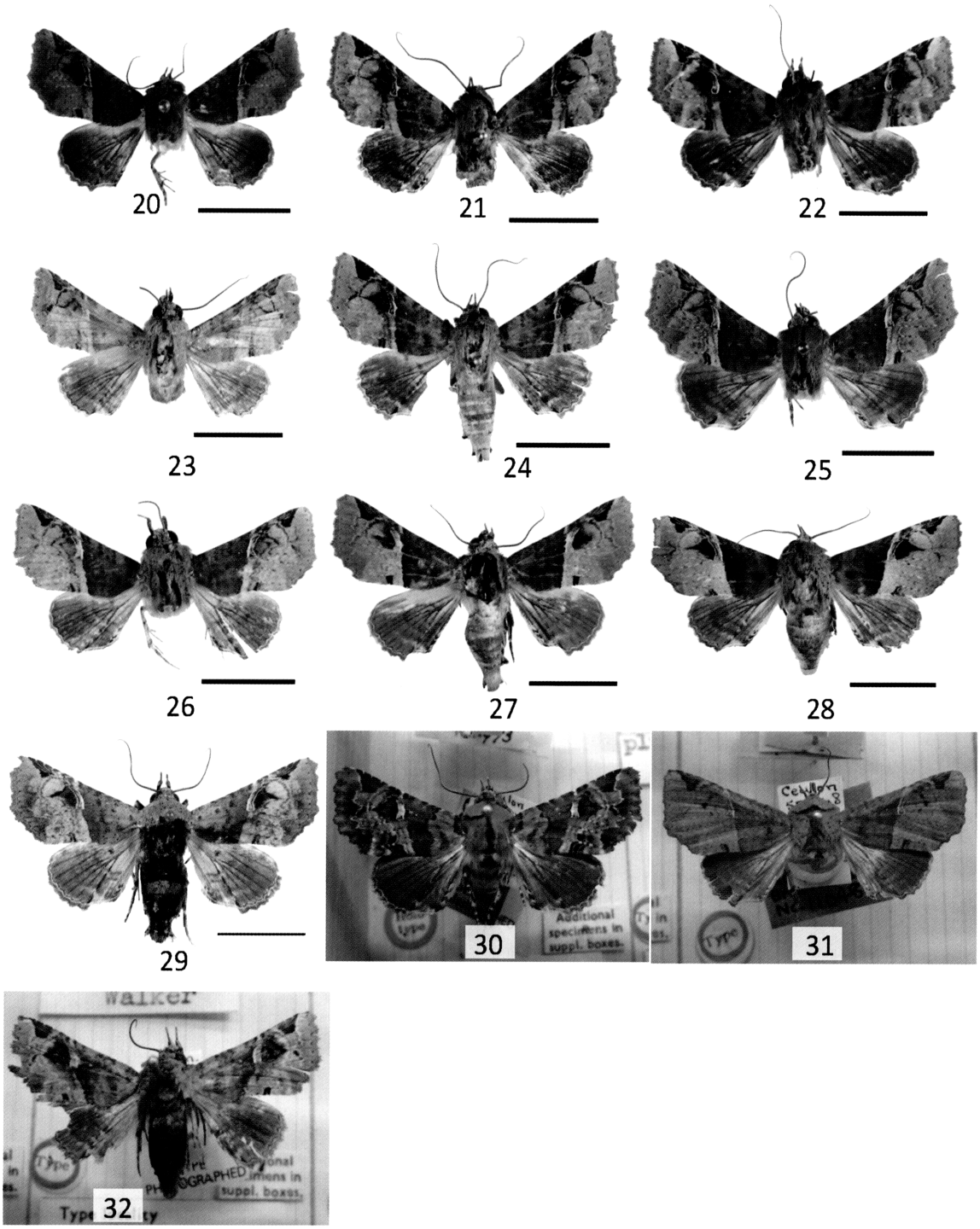

Figs 20-32. Adults of *Targalla* spp. 20: *T. silvicola* sp. nov., ♀. 21: *T. subocellata* (Walker), ♂, [AB915687]. 22: Ditto, ♂. 23: Ditto, ♂, [AB915681]. 24: Ditto, ♀. 25: *T. pantarcha* (Turner) stat. rev., ♂. 26: Ditto, ♂. 27: Ditto, ♀. 28: Ditto, ♀. 29: Ditto, lectotype, ♀. 30: *T. bifacies*, holotype, ♂. 31: *T. ludatrix*, holotype, ♂. 32: *T. repleta*, holotype, ♀. *29: © Australian National Insect Collection, CSIRO. 30-32: © Natural History Museum Collection, NHM. Scale bars = 10mm. GenBank Accession numbers are given in the parentheses.

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Male (Fig. 7). Forewing length 11.4-13.4 mm. Head: labial palpi reddish brown with black scales and speckled with white; frons reddish brown on dorsal half and white on ventral half; vertex densely covered with reddish brown scales; antenna filiform. Thorax: tegulae brown or dark brown, sparsely mixed with black scales; fore- and mid- legs usually brownish black with creamy white band on marginal end of each segment of tarsus, hind-legs white mixed with black and reddish brown scales. Abdomen: brown with dark brown 2nd to 5th or 6th dorsal area, ocherous or creamy brown ventrally. Forewing: ground color brown or dark brown, sometimes purplish-dark brown, distal half dark brown often tinged with gray; inner area of median band rather black; basal, subbasal and antemedial line faint black or almost absent; orbicular spot very small, white or almost absent; reniform stigma brownish yellow, sometimes tinged with dark brown, oblong, distorted and concave on the outside; median band pale purplish, inconspicuous, oblique and slightly curved; postmedial line almost absent or represented by a faint, blackish brown line; subterminal line serrate, and its outer area darker than inner area and with a dark brown triangular shade subapically; a series of black dots on interspaces of veins marginally; cilia reddish brown. Hindwing: uniformly dark brown, slightly cinereous-white at the base; cilia reddish brown.

Female (Fig. 8). Forewing length 12.0-14.4 mm. Generally similar to male, but transverse lines almost inconspicuous; reniform stigma with a characteristic exterior dark chevron area at the outside.

Male genitalia (Figs 35, 36). Uncus very small, hooked, sharply flexed; socius rectangular plate-like, with dense spinules. Tegumen rather thick, smooth, strongly curved in lateral view, with a very long rod-like process at middle part accompanied by uncus at apex; vinculum represented by a distorted, tape-like sclerite; saccus long, relatively broad tongue-like and approximately same length as valva. Valva rectangular and strongly distorted at the outside, slightly concave at the apex. Aedeagus elongate, longer than valva + saccus; rostellum relatively long and slender; vesica multilobed, bearing short conical cornuti and some sclerotized plates.

Female genitalia (Fig. 54). Apophyses posteriores weakly sclerotized and moderate in length. Ostium bursae symmetrical, sclerotized and tapering toward ductus bursae. Ductus bursae narrow, membranous on posterior half and bulging, sclerotized with three patchwise spines on anterior half. Corpus bursae oblong; two signa scobinate and slightly curved inside.

Specimens examined. [INDIA] 3♂, West Bengal, Darjeeling, Mangpu, alt. 1,300m, 2. IV. 1986, W. Thomas leg. (NIAES); 1♂2♀, West Bengal, Darjeeling, Pusbok, alt. 850m, 3-7. IV. 1986, W. Thomas leg. (NIAES); 1♂, West Bengal, Darjeeling, 14-15. VI. 1987, T. Miyashita leg. (NIAES); 1♂, West Bengal, Darjeeling, Tigerhill, alt. 2,400m, 19-28. IV. 1987, W. Thomas leg. (NIAES); [Sri Lanka] Kandy District, 20. VII. 1973, A. Otake leg. (NIAES); [NEPAL] 1♀, Mechi, Ilam, Godok, 400m, 11-18. VI. 1993, M. S. Limbu leg. (NSMT); [LAOS] 1♂, Laos-Vietnam Border: Custom house, 36km NE from Laksao, Bori Kham Xai, alt. 800m, 18. IX. 1998, T. Masui leg. (TMC); 1♀, Hydro power station, 32km NE from Laksao, Bori Kham xai, alt. 750m, 20. IX. 1998, T. Masui leg. (TMC); [VIETNAM] 1♂, Tinh Hue, Back Ma, alt. 1,200m, 24-28. VII. 2001, Y. Kishida leg. (NSMT); 1♀, Tam dao, Vinh Phu District, alt. 900m, 17-21. V. 1990, J. Horak leg. (NSMT); [THAILAND] 1♂, Doi Suthep, 8-10. VII. 1966, Inoue & Okagawa leg. (NIAES); 1♂, Chanthaburi, Phliu, 4.VI. 1983, H. Kuroko, S. Moriuti, Y. Arita & Y. Yoshiyasu leg. (OPU); [CHINA] 1♂, Hainan Is., Near Diaoluoshang resort Hotels, alt. 750/900m, 20. III. 2003. L. T., K. Ueda leg. (KMNH) ; [JAPAN] 1♂, Iriomote-jima Is., 24. VII. 1982, T. Nagayoshi leg. (NIAES); 1♀, Okinawa-jima Is., Kunigami-son, Nishimedake, 18. VI. 1981, K. Deguchi leg. (NIAES); (2♂, 17. IX. 2003), (1♂, 19. IX. 2003), (1♂2♀, 21. IX. 2003), (1♂, 30. IX. 2003), Okinawa Is., Okinawa-city, S. Tominaga (reared) (NIAES); 1♀, Okinawa Is., Kochinda, 3. IX. 2005, S. Tominaga (reared), (AB915690), (NIAES); [INDONESIA] 1♂1♀, W. Jawa, Djatilubur, Purwakarta, 24-25. IX. 1965 (NIAES).

Distribution. This is a widespread species in S. E. Asia. INDIA, SRI LANKA, NEPAL, CHINA, THAILAND, LAOS, VIETNAM, JAPAN (Kyushu, Nansei Isls.), INDONESIA, also recorded from Fiji, Rapa Is., Hawaii Isls. (Holloway, 1985) and AUSTRALIA (GenBank: HQ951350, HQ951351, HQ951352, HQ951353).

Diagnosis and Remarks. This is a relatively small species. The forewing coloration is rather darker than other congeners and the maculation is the most simple in the *delatrix* group. In particular, the most reliable character to distinguish this species from the other congeners is that in this species the outcurved semicircular line located on the subapical portion of the costa to vein M2 or M3 is lacking or faint, while in contrast the line is apparent in other members of the genus.

Targalla palliatrix (Guenée, 1852) (Figs 9, 10, 37, 38, 55)

Penicillaria palliatrix Guenée, 1852: 205. Type locality: Java, Indonesia.

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Eutelia opposita Walker, [1863] 1864: 67.
Eutelia delatrix: Hampson, 1894: 391.
Phlegetonia delatrix: Hampson, 1912: 84.
Targalla palliatrix: Holloway, 1985: 191.

Male (Fig. 9). Forewing length 13.0-15.3 mm. Head: labial palpi reddish brown with black scales and speckled with white; frons reddish brown on dorsal half and white on ventral half; vertex densely covered with reddish brown scales; antenna filiform. Thorax: tegulae grayish brown, sparsely mixed with dark brown scales; forelegs usually brownish black with creamy white band on marginal end of each segment of tarsus, mid- and hindlegs white mixed with black and reddish brown scales. Abdomen: whitish brown with grayish brown 2nd to 5th or 6th dorsal area, creamy brown on ventral half. Forewing: distal half hoary brown; inner area of median band grayish brown; basal, subbasal and antemedial line dark brown, indistinctly speckled with sinuous; orbicular spot very small, white or almost absent; reniform stigma brownish yellow, sometimes tinged with dark brown, oblong, distorted, sometimes slightly defined by a white line at the inside, concave on the outside with an indistinctly exterior dark chevron area; median band pale gray, oblique and slightly curved; postmedial line almost absent or represented by a faint, dark brown-speckled line and its dorsal half forming an outcurved semicircular line located at subapical portion of costa to vein M2 or M3; subterminal line serrate, its outer area darker than inner area and with a dark brown triangular shade subapically; a series of black dots on interspaces of veins marginally; cilia fawnish brown often mixed with reddish brown scales. Hindwing: uniformly dark brown, slightly cinereous-white at the base; cilia fawnish brown often mixed with reddish brown scales.

Female (Fig. 10). Forewing length 12.5-14.4 mm. Generally similar to male, but transverse lines almost inconspicuous, reniform stigma with a characteristic exterior dark chevron area at the outside.

Male genitalia (Figs 37, 38). Uncus very small, hooked, sharply flexed; socius rectangular plate-like, spinules absent. Tegumen rather thick, smooth, strongly curved in lateral view, with a very long rod-like process at middle part accompanying uncus at apex; vinculum represented by a distorted, tape-like sclerite; saccus tongue-like, an inverted triangle. Valva asymmetrical, left valva concave at the outside, rounded at the apex with a large sickle-shaped spur, right valva slightly concave at the outside, strongly folded at the apex with a small spur. Aedeagus elongate, slightly shorter than valva + saccus; rostellum short; vesica multilobed, bearing four conspicuous cornuti, a densely spined band, and a weakly sclerotized plate with minute coarser spines.

Female genitalia (Fig. 55). Apophyses posteriores weakly sclerotized and moderate in length. Ostium bursae asymmetrical, sclerotized with a strongly sclerotized tongue-like lobe and its posterior margin obtuse-angled triangular. Ductus bursae narrow, membranous on posterior half, and bulging, asymmetrically sclerotized triangular, with two strong coarser spiny bands on anterior half. Corpus bursae rounded; signum scobinate and strongly curved inside.

Specimens examined. ♂, Borneo, Sarawak, type of *T. opposita* (OUMNH); [THAILAND] 1♀, Surat Thani, Phanom, Khao Sok Natn. Pk., 100m, 10-11. VIII. 1987, M. Owada leg. (NSMT); [MALAYSIA] 1♀, Jalam Sultan, Abu Baker, Cameron Highlands, 1. XI. 1969, H. Hasegawa leg. (NIAES); 3♂3♀, Taiping, Perak, at light, 5. VIII. 1973 (NIAES); 1♂, Kampong, II. 1982 (NIAES); 2♂1♀, Tanah Rata, Cameron Highlands, III. 1983, at light, T. Hirowatari, A. Kurachi, N. Kawamoto leg. (NIAES); 1♀, Maxwell Hill, Perak, at light, 8. IV. 1983, T. Hirowatari, A. Kurachi, N. Kawamoto leg. (NIAES); 1♀, Cameron Highlands, 1984 (NIAES); 2♂, Genting Highlands, alt. 1,700m, 6-8. IV. 1986, K. Yazaki leg. (NSMT); 1♀, Penin, Pahang, Raub, Bukit Fraser, alt. 1,300m, 17-19. VII. 1987, M. Owada leg. (NSMT); 1♂1♀, Penin, Pahang, Cameron Highlands, G. Berinchang, 1,950m, 21-22. VII. 1987, M. Owada leg. (NSMT); 1♂1♀, Penin, Pahang, Cameron Highlands, Berinchang, 1,400m, 20-22. VII. 1987, M. Owada leg. (NSMT); 1♂1♀, Penin, Kedah, Kuala Muda, Gunung Jerai, alt. 950m, 25. VII. 1987, M. Owada leg. (NSMT); 1♀, Cameron Highlands, alt. 1,800m, V. 1989 (TMC); 2♂1♀, Borneo Is., Sabah, Mt. Kinabalu, Park H. Q., alt. 1,560m, 16-21. III. 1977, N. Kashiwai leg. (NIAES); 1♀, Borneo Is., Sabah, Kenningau, IV-V. 1984, T. Hasegawa leg. (TMC); [INDONESIA] 1♂, Kallo Hill, 23. II. 1985 (TMC); 1♂1♀, near Berastagi, Utara, Mt. Sibayak II, alt. 1,500m, 25. VII. 1989, Arbaimun leg. (TMC); 1♀, Pematang Siantar, North Sumatra, 22. XII. 1992, L. T., S. Yoshimatsu & K. Matsumoto leg. (NIAES); 2♂1♀, Sumatra Is., Utara, Aek Nauli, alt. 1,200m, 19-21. III. 1994, at light, K. Matsumoto & K. Konishi leg. (NIAES).

Distribution. THAILAND (new record), MALAYSIA (Malay peninsula, Borneo Is.) and INDONESIA (Sumatra Is., Java Is.).

Diagnosis and Remarks. This species is very similar to *T. infida* and their morphological differences will be mentioned in the Diagnosis and Remarks under the next species. Probably it is the dominant species in the Malay peninsula.

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Targalla infida Walker, [1858] 1857 **sp. rev.** (Figs 11-14, 39, 40, 56)

Targalla infida Walker [1858] 1857: 1008; Moore, 1884-1887: 63. Type locality: Burma (Hindostan).
Targalla delatrix: Swinhoe, 1890: 228.
Eutelia delatrix: Hampson, 1894: 391.
Phlegetonia delatrix: Hampson, 1912: 84.
Targalla palliatrix: Holloway, 1985: 191.
Targalla sugii: Park *et al*, 2007: 70, pl. 13: 245, pl. 40: 245, pl. 65: 245.

Male (Figs 11, 12, 14). Forewing length 13.8-15.4 mm. Head: labial palpi reddish brown with black scales and speckled with white; frons reddish brown on dorsal half and white on ventral half; vertex densely covered with reddish brown scales; antenna filiform. Thorax: tegulae hoary brown, sparsely mixed with dark brown scales; fore-legs usually brownish black with creamy white band on marginal end of each segment of tarsus, mid- and hind-legs white mixed with black and reddish brown scales. Abdomen: whitish brown with grayish brown 2nd to 5th or 6th dorsal area, creamy brown ventrally. Forewing: distal half hoary brown; inner area of median band grayish brown; basal, subbasal and antemedial line dark brown, indistinctly speckled with sinuous lines; orbicular spot very small, white or almost absent; reniform stigma brownish yellow, oblong, distorted, upper end pointed, bordered by a conspicuous white part at the inside, slightly concave on the outside with a indistinctly exterior dark chevron area; median band pale gray, oblique and slightly curved; postmedial line represented by a faint, dark brown-speckled line and its dorsal half forming an indistinctly outcurved semicircular line located at subapical portion of costa to vein M2 or M3; subterminal line serrate, and its outer area darker than inner area and with a dark brown triangular shade subapically; a series of black dots on interspaces of veins marginally; cilia fawnish brown. Hindwing fuscous, often tinged with reddish pink and accompanied by some white streaks at the distal half; cilia fawnish brown often mixed with reddish brown scales.

Female (Fig. 13). Forewing length 12.6-15.1 mm. Generally similar to male, but transverse lines almost inconspicuous; inner area of median band sometimes slightly tinged with orange; reniform stigma with a characteristic dark exterior chevron area at the outside.

Male genitalia (Figs 39, 40). Uncus very small, hooked, sharply flexed; socius rectangular plate-like, spinules absent. Tegumen rather thick, smooth, strongly curved in lateral view, with a very long rod-like process at middle part accompanying uncus at apex; vinculum represented by a distorted, tape-like sclerite; saccus tongue-like, an inverted triangle. Valva asymmetrical, left valva concave at the outside, rounded at the apex with a large sickle-shaped spur, right valva concave at the outside, with a slightly distorted squarish apex with a small spur. Aedeagus elongate, slightly shorter than valva + saccus; rostellum short; vesica multilobed, bearing four conspicuous cornuti, a densely spiny band and a weakly sclerotized plate with spines.

Female genitalia (Fig. 56). Apophyses posteriores weakly sclerotized and moderate in length. Ostium bursae asymmetrical, sclerotized and with a weakly sclerotized tongue-like lobe and its posterior margin acute-angled triangular. Ductus bursae narrow, membranous on posterior half, and bulging, an asymmetrical sclerotized, triangular plate with two distinct coarse spiny bands on anterior half. Corpus bursae rounded; signum scobinate and strongly curved inside.

Specimens examined. ♂, Burma (Hindostan), Moulmein, holotype of *T. infida* (NHM); [LAOS] 2♂, Hydro power station, 32km NE from Laksao, Bori Kham xai, alt. 750m, 20. IX. 1998, T. Masui leg. (TMC); 1♂, Xieng Khouang Prov., Phou Samsoum, alt. 1,940m, 23. V. 2013, L. T., S. Yoshimatsu & D. Watabiki leg., (AB915689), (NIAES); [VIETNAM] 1♀, Vinh Phu Prov., Tam Dao, 930m, 21-24. IV. 1995, M. Owada leg. (NSMT); [MALAYSIA] 1♀, Borneo Is., Sabah, Kenningau, IV-V. 1984, T. Hasegawa leg. (TMC); [PHILIPPINES] 1♀, Leyte Is., XII. 1994 (NIAES); 1♂, Mindanao is., Davao, Upper Baracatan, Apo Range, Mt. Talomo, 1,100m, 3-6. VIII. 1985, M. Owada leg. (NSMT); [INDONESIA] 1♂, Sulawesi Is., Puncak Dingin, Poso, alt. 2,000m, 14-21. X. 1985, S. Nagai leg. (TMC); 1♂, Sulawesi Is., Nr. north border, Puncak Dingin, 1,700m, IX-X. 1985, S. Nagai leg. (NIAES); 1♂, Sulawesi Is., Sampuraga, Puncak, Pendoro side, 1,300m, 23. VIII. 1994, T. Masui leg. (TMC); 1♀, W. Papua, 40km south of Takar, 12. VIII. 2000, L. T., alt. 600m, N. Onishi leg. (TMC).

Distribution. MYANMAR (BURMA), LAOS (new record), North VIETNAM (new record), MALAYSIA (new record: Borneo Is.), PHILIPPINES (new record: Leyte Is., Mindanao Is.) , INDONESIA (new record: Sulawesi Is., New Guinea Is.) and AUSTRALIA (new record: GenBank: HQ951349).

Diagnosis and Remarks. Holloway (1985) treated this species as a synonym of *T. palliatrix*. However, this species is distinguishable from the other congeners by the following characteristics. The reniform stigma of the forewings of *T. infida* is defined by a conspicuous white line on the inside and the hindwings are often tinged with reddish pink. In the male genitalia the apical lobe of the right valva of *T. infida* is not folded strongly as it

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is in *T. palliatrix* and in the female genitalia the tongue-like lobe of the ostium bursae is not protruded strongly as it is in *T. palliatrix*. The holotype is shown in Fig. 14. Mr A. Giusti of NHM, London sent us the image of its genitalia slide "BM Noctuid Slide No. 11049" and we consider that the male genitalia of the holotype of *T. infida* obviously represent the same species as those we illustrated in Figs 39 & 40. In addition, the adult specimen illustrated in pl. 13: 245, male genitalia in pl. 40: 245 and female genitalia in pl. 65: 245 by Park *et al.* (2007) as *T. sugii* are misidentifications and we consider them to represent *T. infida.*

Targalla sugii Holloway, 1985 (Figs 15, 16, 41-43, 57)

Targalla sugii Holloway, 1985: 191. Type locality: Cherrapunji, India.

Male (Fig. 15). Forewing length 12.8-15.8 mm. Head: labial palpi reddish brown with black scales and speckled with white; frons reddish brown on dorsal half and white on ventral half; vertex densely covered with reddish brown scales; antenna filiform. Thorax: tegulae brown, sparsely mixed with dark brown scales; fore-legs usually brownish black with creamy white band on marginal end of each segment of tarsus, mid- and hind-legs white, mixed with black and reddish brown scales. Abdomen: grayish brown with brown 2nd to 5th or 6th dorsal area, creamy brown ventrally. Forewing: distal half grayish brown; inner area of median band brown; basal, subbasal and antemedial line usually dark brown, indistinctly speckled or almost absent; orbicular spot very small, white or almost absent; reniform stigma brownish yellow, often tinged with dark orange, oblong, distorted and concave on the outer side with a inconspicuous dark exterior chevron area; median band pale gray, oblique and slightly curved; postmedial line almost absent or represented by a faint, dark brown-speckled line and its dorsal half forming an outcurved semicircular line located at subapical portion of costa to vein M2 or M3; subterminal line serrate, and its outer area darker than inner area and with a dark brown triangular shade subapically; a series of black dots on interspaces of veins marginally; cilia fawnish brown. Hindwing: uniformly dark brown, slightly cinereous-white at the base; cilia reddish brown.

Female (Fig. 16). Forewing length 13.9-16.4 mm. Generally similar to male, but transverse lines almost inconspicuous; reniform stigma with a characteristic exterior dark chevron area at the outside.

Male genitalia (Figs 41-43). Uncus very small, hooked, sharply flexed; socius rectangular plate-like, with spinules. Tegumen rather thick, smooth, strongly curved in lateral view, with a very long rod-like process at middle part accompanying uncus at apex; vinculum represented by a distorted, tape-like sclerite; saccus long, relatively broad, tongue-like and approximately same length as valva. Valva distorted and rectangular, apically bifid and bearing a long stick-like process. Aedeagus short, almost same length as valva; rostellum strongly bent at the apex; vesica multilobed, bearing three conspicuous slender cornuti (B, C, D), a short cornutus (A) and a densely spiny band (E).

Female genitalia (Fig. 57). Apophyses posteriores weakly sclerotized and moderate in length. Ostium bursae symmetrical and sclerotized. Ductus bursae narrow, membranous on posterior half and bulging, asymmetrical sclerotized triangle, left side strongly protruded, with two small spiny bands on anterior half. Corpus bursae rounded; signum scobinate.

Specimens examined. [INDIA] ; 1♂, W. Bengal, Darjeeling, alt. 2,000m, 11-20. VIII. 1985 (NIAES); 1♂, W. Bengal, 9 miles village on road to Sikkim, ca. 23km from Darjeeling, alt. 1,700m, 18. VII. 1985 (NIAES); 1♂, W. Bengal, Darjeeling, alt. 2,000m, 8. IV. 1986, W. Thomas leg. (NIAES); 2♀, W. Bengal, Darjeeling, Ghoom, 2,200m, 27. III. 1986, W. Thomas leg. (NIAES); 2♀, W. Bengal, Darjeeling, Tigerhill, alt. 2,400m, 19-28. VI. 1987, W. Thomas leg. (NIAES); [NEPAL] 1♂, Kathmandu, Mt. Phulchouki, 2,275m, 2. VII. 1990 (NSMT); 1♀, Kathmandu, Mt. Pulchouki, alt. 2,770m, 21. VII. 1990 (NSMT); 1♂, Sagarmatha, Okhaldhunga, 600m, 13. II. 1990, K. Ito leg. (NSMT); 1♀, Sagarmatha, Okhaldhunga, alt. 1,800m, 15. VII. 1991, K. Ito leg. (NSMT); 1♂, Kathmandu, Godavari, alt. 1,600m, 24. III. 1992, M. S. Limbu leg. (NSMT); (2♂1♀, 11-18. VI. 1993), (1♂, 8-17. X. 1993) Mechi Ilam, Godok, alt. 400m, M. S. Limbu leg. (NSMT); 1♀, Gandaki Zone, Kaski Dist., Pokhara, alt. 850m, 26-31. III. 1993 (NSMT); 1♂, Kosi, Pheksinda, alt. 780m, 6-13. V. 1994, M. S. Limbu leg. (NSMT); 1♀, Mahakali, Dandeldhula, alt. 1,900m, 1-4. VI. 1995, T. Haruta leg. (NSMT); [VIETNAM] 1♀, Lao Cai Prov., Ta Phin, alt. 1296m, L. T., N:22°23'485"/ E:103°50'871", 25. VI. 2012, S. Yoshimatsu & D. Watabiki leg., (AB915682), (NIAES)

Distribution. North INDIA, NEPAL, THAILAND and North VIETNAM (new record).

Diagnosis and Remarks. As the wing markings and coloration of this species are very similar to *T. silvicola* sp. nov., it is impossible to distinguish the two species externally. However they are easily distinguishable by the characteristic forms of the apical valves of the male genitalia. In particular, the apex of the valva of

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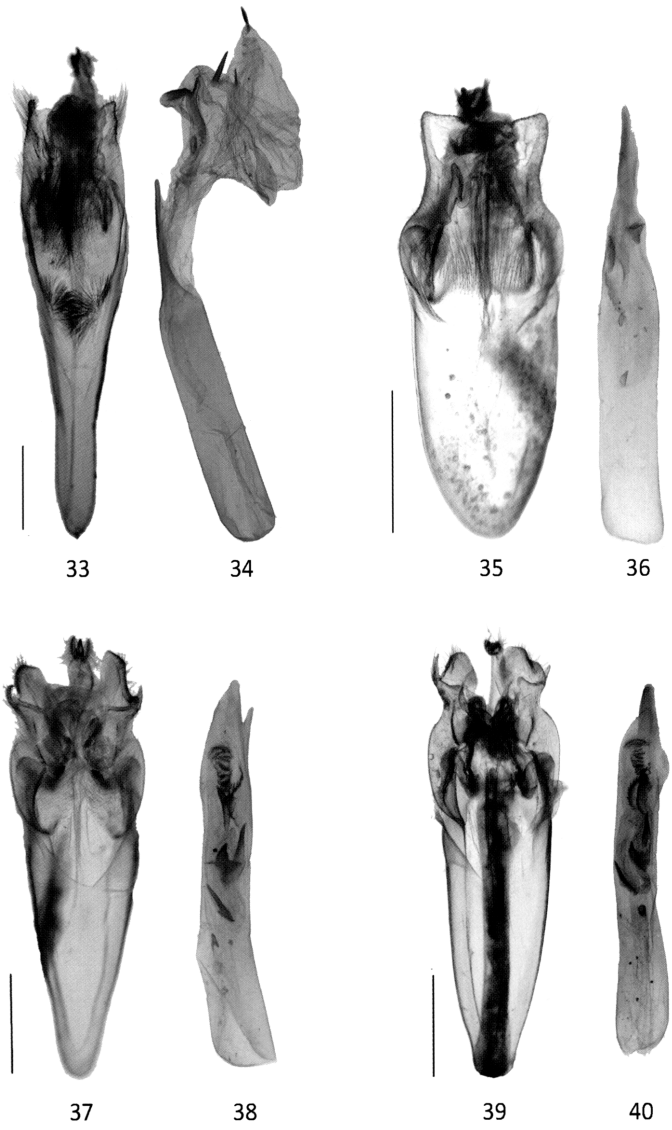

Figs 33-40. Male genitalia of *Targalla* spp.
33-34: *T. atripars* (Hampson). 35-36: *T. delatrix* (Walker). 37-38: *T. palliatrix* (Walker). 39-40: *T. infida* Walker sp. rev.

T. sugii is bifid. The dorsal portion is roundly protruded and the ventral portion bears a long stick-like process. In contrast, the long stick-like process is lacking or almost absent on the apex of the valva of *T. silvicola*. In addition, the illustration of a Thai specimen shown by Kononenko and Pinratana (2005) as *T. sugii* correctly represents one of these species, but it could possibly be the next species. As mentioned in the Diagnosis and Remarks on *T. infida*, a specimen and male and female genitalia illustrated as *T. sugii* by Park *et al*. (2007) are a misidentification and we considered them to belong to *T. infida*. Additionally, the adult specimens illustrated by Kononenko and Pinratana (2013) as *T. palliatrix* (pl. 20: 52) and *T. delatrix* (pl. 20: 53) probably represent this or the next species. Furthermore, on the basis of a female specimen we collected from North Vietnam, we newly

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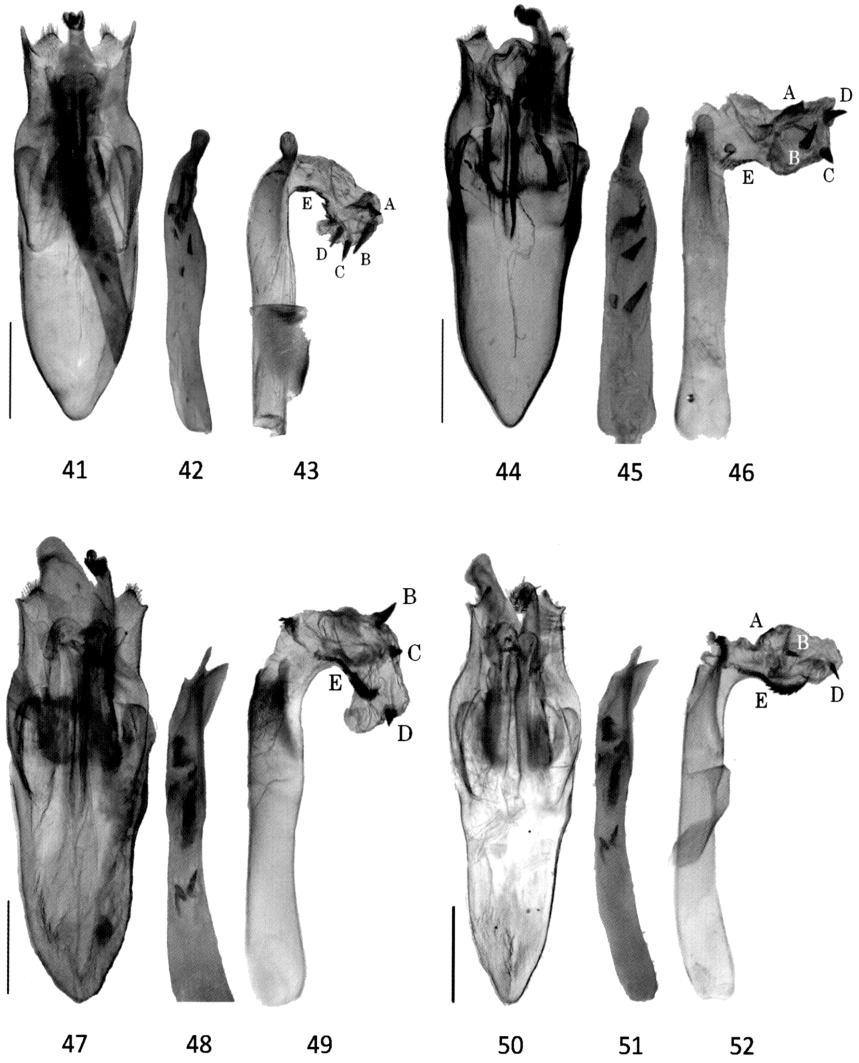

Figs 41-52. Male genitalia of *Targalla* spp.
41-43: *T. sugii* Holloway. 44-46: *T. silvicola* sp. nov. 47-49: *T. subocellata* (Walker). 50-52: *T. pantarcha* (Turner) stat. rev.

record *T. sugii* from Vietnam in this paper. This species is widely distributed in Nepal.

Targalla silvicola Watabiki & Yoshimatsu, **sp. nov.** (Figs 17-20, 44-46, 58)

[Newly proposed Japanese name: Marumon-neguro-fusayaga]

Phlegetonia delatrix: Kuroko, 1957: 76; Watanabe, 1980: 150; Sugi, 1982: 789 (in part).
Targalla delatrix: Kishida, 2011: 267 (in part).
Targalla subocellata: Wang and Kishida, 2011: 245; Zahiri *et al.*, 2011: 164.

Male (Figs 17, 18). Forewing length 12.9-15.3 mm. Head: labial palpi reddish brown with black scales and speckled with white; frons reddish brown on dorsal half

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and white on ventral half; vertex densely covered with reddish brown scales; antenna filiform. Thorax: tegulae brown, sparsely mixed with dark brown scales; forelegs usually brownish black with creamy white band on marginal end of each segments of tarsus, mid- and hindlegs white, mixed with black and reddish brown scales. Abdomen: grayish brown with brown 2nd to 5th or 6th dorsal area, creamy brown ventrally. Forewing: distal half grayish brown; inner area of median band brown; basal, subbasal and antemedial line usually dark brown, indistinctly speckled or almost absent; orbicular spot very small, white or almost absent; reniform stigma brownish yellow, often tinged with dark orange, oblong, distorted and concave on the outer side with an inconspicuous dark exterior chevron area; median band pale gray, oblique and slightly curved; postmedial line absent or represented by a faint, dark brown-speckled line and its dorsal half forming an outcurved semicircular line located at subapical portion of costa to vein M2 or M3; subterminal line serrate, its outer area darker than inner area and with a dark brown triangular shade subapically; a series of black dots on interspaces of veins marginally; cilia fawnish brown. Hindwing: uniformly dark brown, slightly cinereous-white at the base; cilia reddish brown. Female (Figs 19, 20). Forewing length 13.4-14.9 mm. Generally similar to male, but transverse lines almost inconspicuous; reniform stigma with a characteristic dark exterior chevron area at the outside.

Male genitalia (Figs 44-46). Uncus very small, hooked, sharply flexed; socius rectangular plate-like, with spinules. Tegumen rather thick, smooth, strongly curved in lateral view, with a very long rod-like process at middle part accompanying uncus at apex; vinculum represented by a distorted, tape-like sclerite; saccus long, relatively broad, tongue-like and approximately same length as valva. Valva distorted and rectangular, apex with weakly sclerotized and triangular lobes bending dorsally. Aedeagus elongate, almost same length as valva + saccus; rostellum rather short; vesica multilobed, bearing three conspicuous same sized cornuti (B, C, D), a plate-like cornutus (A) and a densely spiny band (E).

Female genitalia (Fig. 58). Apophyses posteriores weakly sclerotized and moderate in length. Ostium bursae symmetrical and sclerotized. Ductus bursae narrow, membranous on posterior half and bulging, sclerotized, squarish, with two dense spiny patches on anterior half. Corpus bursae rounded; signum scobinate and slightly curved inside.

Type materials. Holotype (Fig. 17): ♂, N. Vietnam, Lao Cai Prov., Tram Ton, Sapa, alt. 1,926m, L. T., N:22°21'182"/ E:103°46'490", 22-23. VI. 2012, S. Yoshimatsu & D. Watabiki leg., GenBank accession number: AB915685 (NIAES). Paratypes: [CHINA] 2♂2♀, Guangdong, Shaoguan, Nanling, alt. 1,000m, 29. VII.- 1. VIII. 2002, Y. Kishida leg. (NIAES); 1♀, Guangdong, Shaoguan, Nanling, alt. 1,000m, 29-31. VII. 2002, Y. Kishida leg. (NSMT); 1♂1♀, Guangdong, Shaoguan, Nanling, alt. 1,100m, 29. III-1. IV. 2003, Y. Kishida leg. (NIAES); 1♀, Guangdong, Nankunshan, alt. 600m, 8. VIII. 2003, Y. Kishida leg. (NIAES); 2♀, Guangdong, Shaoguan, Nanling, alt. 1,100m, 9-12. VIII. 2003, Y. Kishida leg. (NIAES); 1♀, Guangdong, Shaoguan, Nanling, alt. 1,100m, 20-24. II. 2003, K. Yazaki leg. (NIAES); 1♂, Guangdong, Shaoguan, Nanling, alt. 700-1,200m, 18-22. VI. 2003, K. Suzuki leg. (NIAES);1♂, Guangdong, Shaoguan, Nanling, alt. 600-1,300m, 18-22. VI. 2003, K. Suzuki leg. (NSMT); 1♂, Guangdong, Shaoguan, Nanling, alt. 1,100m, 31. VIII. -1. IX. 2003, K. Horie leg. (NSMT); 1♂1♀, Guangdong, Shaoguan, Nanling, alt. 800-1,400m, 18-21. V. 2004, M. Owada leg. (NSMT); 1♀, Guangdong, Shaoguan, Nanling, alt. 700-1,200m, 22-27. VII. 2004, Y. Kishida leg. (NSMT); 1♂7♀, Guangdong, Shaoguan, Nanling, alt. 800-1,200m, 23-25. IV. 2004, K. Horie leg. (NSMT); 1♂1♀, Guangdong, Shaoguan, Nanling, alt. 700-1,200m, 3-4. VII. 2004, K. Horie leg. (NSMT); 1♀, Guangdong, Shaoguan, Nanling, alt. 700-1,200m, 22-27. VII. 2004, Y. Kishida leg. (NSMT); 1♀, Guangdong, Shaoguan, Nanling, 700-1,200m, 27-29. III. 2004, H. Yoshimoto leg. (NSMT); 1♀, Guangdong, Shaoguan, Nanling, alt. 700-1,200m11-15. IV. 2005, K. Suzuki leg. (NSMT);1♀, Guangdong, Shaoguan, Nanling, alt. 800-1,400m, 5-11. IX. 2005, M. Owada leg. (NSMT); 3♂4♀, Guangdong, Shaoguan, Nanling, alt. 900-1,400m, 7-8. 12-13. VII. 2007, M. Owada leg. (NSMT); 1♀, Guangxi, Guilin, Mao' ershan, alt. 1,000m, 14-16. VIII. 2009, M. Owada & M. Wang leg., (AB915686), (NSMT); 1♀, Guangxi, Guilin, Mao' ershan, alt. 1,400m, 19. VIII. 2009, M. Owada & M. Wang leg., (AB915687), (NSMT); 1♀, Guangdong, Lianzhou, Dadongshan, 650m, 16. V. 2010, M. Owada & M. Wang leg. (NSMT); 2♂, Guangdong, Lianzhou, Dadongshan, 650m, 9. V. 2011, M. Owada & G. Huang leg., (AB915688), (NSMT); [LAOS] 1♂, 32km NE from Laksao, Bori Kham Xai, Hydro Power Station, alt. 750m, 18. IX. 1998, T. Masui leg. (TMC); [VIETNAM] 1♂, Cao Bang Prov., Cum Cuoi, alt. 400m, 30. IX. -2. X. 1994, M. Owada leg. (NSMT); 1♀, Vinh Phu Prov., Tam Dao, alt. 930m, 22-26. IX. 1994, M. Owada leg. (NSMT); 1♀, Lao Cai Prov., Sapa, alt. 1,700m, 3-5. VIII. 2000, Y. Kishida leg. (NSMT); (1♀, 22-23. VI. 2012), (1♀26. VI. 2012), Lao Cai Prov., Tram Ton, Sapa, alt. 1,926m, L. T., N:22°21'182"/ E:103°46'490", S. Yoshimatsu & D. Watabiki leg., (AB915683, AB915684), (NIAES);

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[TAIWAN] 2♂2♀, Lushan Spa., 26-29. VII. 1981, A. Seino leg. (NIAES); 1♀, Hualien, Tze-en, Nr. Pilu, alt. 2,000m, 4-6. VI. 1982, T. Tanabe leg. (NSMT); 1♂, Nantou Hsien, Nanshanchi, alt. 800m, 25-26. VII. 1983, S. Sugi leg. (NIAES); 1♂, Nantou Hsien, Lushan Spa, alt. 1,200m, 29. IV. -1. V. 1984, H. Yoshimoto leg. (NSMT); 2♂1♀, Kaohsiung Hsien, Shihtyutou, 15-20. V. 1984, L. T., S. Yoshimatsu leg. (NIAES); 2♂, Chiayi Hsien, Mt. Alishan, alt. 2,200m, 2-5. VIII. 1984, K. Yazaki leg. (NSMT); 1♀, Kaosing Hsien, Boashan, 7. IX. 1986, R. L. Chen leg. (TMC); 1♂1♀, Nantou Hsien, Sonkan, Renai Siang, 2,000m, 2. VIII. 1986, L. K. Ki leg. (TMC); 1♂, Nantou Hsien, Nanshanchi, alt. 800m, 6. VI. 1988, S. Sugi leg. (NIAES); [JAPAN] 1♂, Amami-oshima, Mt. Yuwandake, 16-17. VII. 1963, H. Inoue leg. (NIAES); 1♀, Yakushima Is., Kurio, 6-7. VIII. 1972, K. Ishizuka leg. (NIAES); 1♀, Yakushima Is., Kurio, 15. V. 1972, T. Watanabe leg. (NIAES); 1♂, Yakushima Is., Mt. Aikodake, 8. VI. 1972. T. Watanabe leg. (NIAES); 1♂, Yakushima Is., Mt. Kuromidake, 10. VII. 1972. T. Watanabe leg. (NIAES); 1♂, Yakushima Is., Anbo, 26. VII. 1976, Y. Kawakami leg. (NIAES); 1♂, Yakushima Is., Anbo, 30. VII. 1976, Y. Kawakami leg. (NIAES); 3♂, Amami-oshima, Mt. Yui-dake, 13-15. VIII. 1977, R. Sato leg. (NAIES); 1♂, Okinawa Is., Kunigami-son, Fuku-dam, 26. VI. 1981, K. Deguchi leg. (NIAES); 1♀, Ishikawa Pref., Oshimizu-machi, Sogo, 21. VII. 1990, I. Togashi leg. (NIAES)

Distribution. CHINA (Guangdong, Guangxi, Hong Kong), North VIETNAM, LAOS, TAIWAN and JAPAN (Honshu, Kyushu, Yakushima Is., Amami-oshima Is., Okinawa Is.).

Diagnosis and Remarks. As this new species is very similar to *T. sugii* whose wing coloration is also very variable, their genitalia should be carefully checked for exact identification. Their morphological differences were mentioned in the Diagnosis and Remarks on *T. sugii*. Additionally, the male genitalia of this species also resemble those of *T. subocellata* and *T. pantarcha*, but this species is distinguishable from them as follows. The male genitalia of this species are apparently smallest of the three and the conspicuous three same sized cornuti (Fig. 45) are located equally spaced in the aedeagus if observed through the aedeagus when the vesica is not everted. The female genitalia of *T. silvicola, T. subocellata* and *T. pantarcha* are very similar, but patchwise spines on the anterior half of the ductus bursae of this species are not so dense as in *T. subocellata*. The ostium bursae of the female genitalia of *T. pantarcha* are asymmetrical with a slightly protruded left side, but they are symmetrical without the protruded portion in *T. silvicola* and *T. subocellata*. The record from Honshu, Japan is based on a female specimen from Ishikawa Prefecture.

Etymology. The specific epithet, silvicola means "a resident of forest" and it is derived from the habitat environment where this species was collected.

Targalla subocellata (Walker, [1863] 1864) (Figs 21-24, 47-49, 59)

Eutelia subocellata Walker, [1863] 1864: 67. Type locality: Sarawak, Borneo, Malaysia.
Targalla delatrix: Swinhoe, 1900: 85.
Phlegetonia delatrix: Hampson, 1912: 84.
Targalla subocellata subocellata: Holloway, 1985: 192; Park *et al.*, 2007: 69 (in part), pl. 12: 243, pl. 64: 243.
Targalla palliatrix: Park *et al.*, 2007: 70, pl. 12: 244, pl. 40: 244, pl. 65: 244.

Male (Figs 21-23). Forewing length 14.7-16.2 mm. Head: labial palpi reddish brown with black scales and speckled with white; frons reddish brown on dorsal half and white on ventral half; vertex densely covered with reddish brown scales; antenna filiform. Thorax: tegulae greenish gray, sparsely mixed with reddish brown scales; fore-, mid- and hind-legs white, mixed with black and reddish brown scales. Abdomen: gray with fuscous or dark gray 2nd to 5th or 6th dorsal area, whitish or yellowish brown with two blackish brown lines ventrally. Forewing: distal half entirely gray; inner area of median band greenish gray; basal, subbasal and antemedial line usually dark brown or sometimes reddish brown, indistinctly speckled or almost absent; orbicular spot very small, white or almost absent; reniform stigma dark orange yellow, oblong, distorted and concave on the outer side with a characteristic dark exterior chevron area; median band orange yellow, oblique and slightly curved; postmedial line almost absent or represented by a faint dark reddish brown line and its dorsal half forming a comparatively conspicuous outcurved semicircular line located at subapical portion of costa to vein M2 or M3; subterminal line serrate, with its outer area darker than inner area and with a dark brown triangular shade subapically; a series of black dots on interspaces of veins marginally; cilia dark gray. Hindwing: uniformly dark brown, slightly cinereous-white at the base; cilia dark gray, sometimes mixed with reddish brown.

Female (Fig. 24). Forewing length 13.9-16.4 mm. Similar to male, but lacking two blackish brown lines in the ventral center of abdomen and with reddish brown 7th and 8th segments.

Male genitalia (Figs 47-49). Uncus very small, hooked, sharply flexed; socius rectangular plate-like, with spinules. Tegumen rather thick, smooth, strongly

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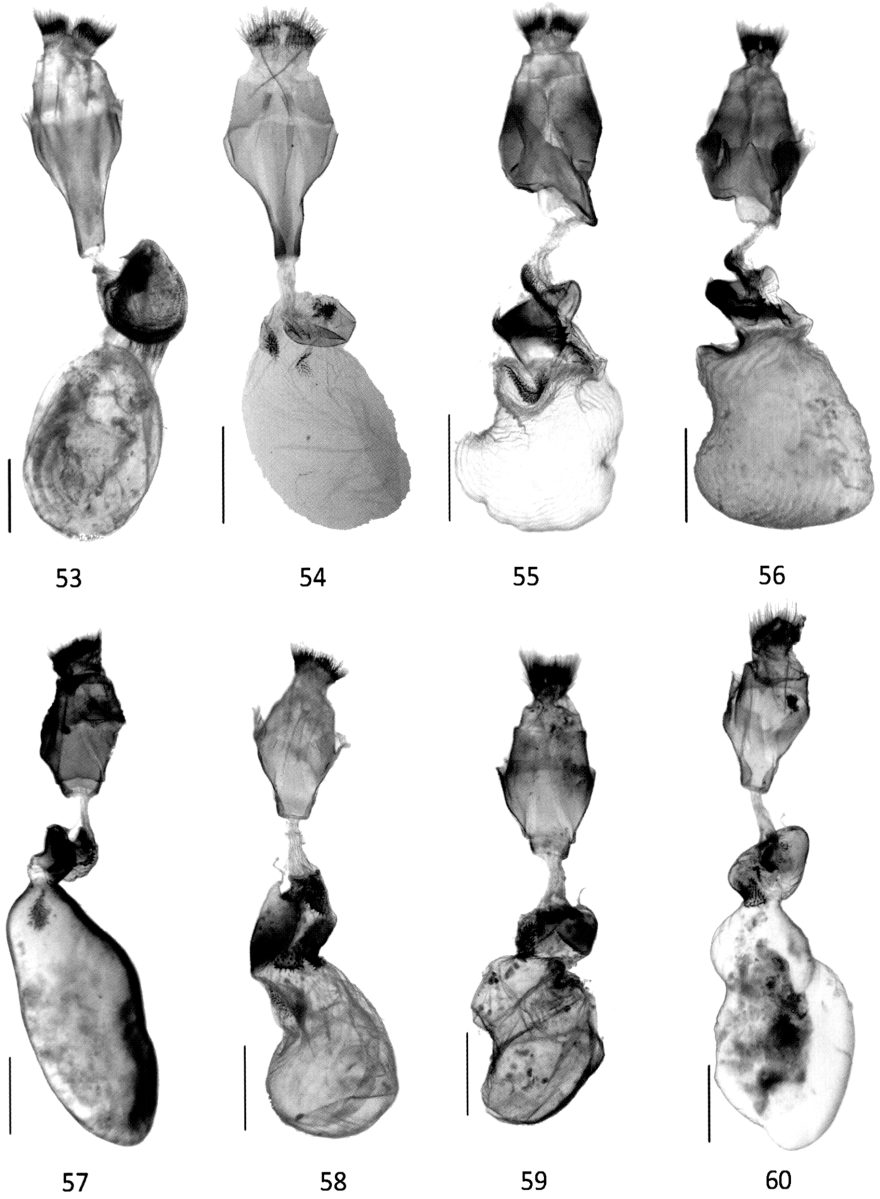

Figs 53-60. Female genitalia of *Targalla* spp.
53: *T. atripars* (Hampson). 54: *T. delatrix* (Walker). 55: *T. palliatrix* (Walker). 56: *T. infida* Walker sp. rev. 57: *T. sugii* Holloway. 58: *T. silvicola* sp. nov. 59: *T. subocellata* (Walker). 60: *T. pantarcha* (Turner) stat. rev.

curved in lateral view, with a very long rod-like process at middle part accompanying uncus at apex; vinculum represented by a distorted, tape-like sclerite; saccus long, relatively broad, tongue-like and approximately same length as valva. Valva distorted and rectangular, apex with weakly sclerotized and triangular lobes bending dorsally. Aedeagus elongate, almost same length as valva + saccus; rostellum rather short and slender; vesica multilobed, bearing three conspicuous cornuti (B, C, D; lacking A) and a densely spiny band (E).

Female genitalia (Fig. 59). Apophyses posteriores weakly sclerotized and moderate in length. Ostium bursae symmetrical and sclerotized. Ductus bursae narrow, membranous on posterior half and bulging,

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sclerotized, squarish, with two dense spiny patches on anterior half. Corpus bursae rounded; signum scobinate and slightly curved inside.

Specimens examined: [INDIA] 1♀, West Bengal, Darjeeling, alt. 2,100m, 8. IX. 1983, M. Owada leg. (NSMT); [CHINA] 1♂, Hainan Is., Near Diaoluoshang, Resort Hotels, alt. 750/900m, 20. III. 2003, L. T., K, Ueda leg. (KMNH); (1♂, 22. V. 2004), (1♂, 21. X. 2006), Hainan Is., Jianfengling, alt. 900m, K. Ueda leg. (KMNH); 1♂, Hainan Is., Hongshan, 22. X. 2006, L. T., K. Ueda leg. (KMNH); [THAILAND] 1♂1♀, Nakhon Nayok, Khao Yai, alt. 800m, 15. IV. 1983, Kuroko, Moriuti, Arita & Yoshiyasu leg. (OPU); 1♂, Chanthaburi, Khao Soi Dao, alt. 400m, 7-8. X. 1985, Kuroko, Moriuti, Saito & Arita leg. (OPU); 1♂, Loei, Phu Rua, Natn. Pk., alt. 1,200m, 21.VIII. 1987, M. Owada leg. (NSMT); [LAOS] 2♂, Xieng Khouang Prov., Phou Samsoum, alt. 2,039m, N:19°08'14"/ E:103°47'11", 27. V. 2013 L.T., S. Yoshimatsu & D. Watabiki leg., (AB915678, AB915679), (NIAES); (1♀, 23. V. 2013), (1♀, 30. V. 2013), Xieng Khouang Prov., Phou Samsoum, alt. 1,940m, N:19°08'70"/ E:103°46'81", at light, S. Yoshimatsu & D. Watabiki leg., (AB915677), (NIAES); 1♀, Xieng Khouang Prov., Phou Samsoum, alt. 2,064m, N:19°08'44"/ E:103°47'14", 28. V. 2013, L. T., S. Yoshimatsu & D. Watabiki leg. (NIAES); [VIETNAM] 1♂1♀, Tam Dao, Vinh, Phu distr., alt. 900m, 6-10, X, 1990, J. Horak leg. (NSMT); 1♂, Tam Dao, Vinh Phu, alt. 930m, 5-8. V. 1999, H. Yoshimoto leg. (NSMT); (13♂15♀, 22-23. V. 2012), (2♂, 26. V. 2012), Lao Cai Prov., Tram Ton, Sapa, alt. 1,926m, L. T., N:22°21'182"/ E:103°46'490", S. Yoshimatsu & D. Watabiki leg., (AB915675), (NIAES); 1♂, Lao Cai Prov., Ta Phin, alt. 1,296m, L. T., N:22°23'485"/ E:103°50'871", 25. VI. 2012, S. Yoshimatsu & D. Watabiki leg., (AB915676), (NIAES); 1♀, Lao Cai Prov., Ta Phin, alt. 1,296m, L. T., N:22°23'485"/ E:103°50'871", 25. VI. 2012, M. Owada leg. (NSMT); 1♂, Dak Lak Prov., Krong Bong District, Chu Yang Sin National Park, alt. 733m, N:12°28'01.9"/ E:108°20'25.5", L. T., 13. III. 2013, T. Mita *et al.* leg., (AB915680), (NIAES); [MALAYSIA] 4♂, Selangor, Fraser's Hill, alt. 1,500m, 27-30. IV. 1986, S. Saito leg. (NSMT);1♂1♀, Frasser's Hill, L. T., 28-29. VI. 1987, I. Hattori, M. Miyazaki and S. Yoshimatsu leg. (NIAES); 1♀, Genting Highland, alt. 1,700m, 20-22. IV. 1979, S. Asahina leg. (NSMT); 1♂2♀, Genting Highlands, alt. 1,700m, 6-8. VI. 1986, Y. Yazaki leg. (NSMT); 1♂, Cameron Highland, Abu Baker, Jalam Sultar, 1. XI. 1969, H. Hasegawa leg.(NIAES); 8♂, Pahang, Cameron High lands, G. Berinchang, alt. 1,950m, 21-22. VII. 1987, M. Owada leg. (NSMT); 2♂3♀, Cameron highland, alt. 1,800m, V. 1989, (TMC); 2♂, Borneo Is., Sabah, Kenningau, IV-V. 1984, T. Hasegawa leg. (TMC); 1♀, Borneo Is., Sabah, Mt. Emas, 12. V. 1995, H. Matsuda leg. (TMC); (3♂1♀, VIII. 1995), (1♂, VII. 1996), Borneo Is., Sabah, Croker range, (TMC); 1♂, Borneo Is., Kota Kinabalu, Crokekr range, alt. 1,600m, 1-20. III. 1992, (NSMT); 2♂, Borneo Is., Sarawak, Kuchin, Mt. Serapi, alt. 700m, 25. IV. 1990, (Masui's collection); [INDONESIA](1♂, 19. XII. 1992), (1♂, 23. XII. 1992), N. Sumatra, Pematang Siantar, L. T., S. Yoshimatsu & K. Matsumoto leg. (NIAES); 1♂, N. Sumatra, Kallo-hill, 19. II. 1985, (TMC); 1♂, Sumatra, Brastagi, XII. 1991, (TMC); [PHILIPPINES] 1♂, Palawan Is., Victoria Peaks, Trident Mines (Nr. Narra), alt. 500m, 3-5. IX. 1985, M. Owada leg., (NSMT); 1♀, Palawan Is., Brooke's Pt., 4. III. 1995 (NIAES); 1♂3♀, Palawan Is., Mt. Mantalingajan, alt. 1,000m, 9-13. III. 2000, D. Mohagan leg., (TMC); 1♂, Negros Is., Mt. Canlaon, alt. 2,550m, 18-22. VI. 1998, D. Mohagan leg.,(TMC); 2♂, Negros Is., Mt. Canlaon, alt. 2,100m, 5-10. VII. 1999, (TMC); (5♂, III-IV. 1985), (3♂, VIII. 1986), Luzon Is., Mt. Thomas, alt. 2,000m, (TMC); 1♂, Panay Is., Valderrama, Antique, Mt. Baloy, alt. 1,000m, VI. 2010, D. Mohagan leg., (AB915681), (TMC); 1♂, Mindanao Is., Mt. Apo, alt. >2,000m, 10-13. VIII. 2001, R. Cabale leg., (TMC); (1♀, 25. XI-1. XII. 2001), (1♀, 3-9. XIII. 2001), Mindanao Is., Mt. Apo, alt. 1,300m, R. Cabale leg., (TMC); 3♀, Mindanao Is., Davao, Baracatan, Mt. Talomo, alt. 1,100m, 17-19. VIII. 1985, M. Owada leg., (NSMT)

Distribution. INDIA, CHINA (new record: Hainan Is.), THAILAND, LAOS, VIETNAM, MALAYSIA (Malay Peninsula, Borneo Is.), INDONESIA(Sumatra Is.) and PHILIPPINES (Luzon Is., Panay Is., Negros Is., Mindanao Is. Palawan Is.) From India to S. E. Asia and the Philippines.

Diagnosis and Remarks. This is a relatively larger species. This species is easily distinguishable from the other congeners by the orange yellow median band, while other members possess a pale whitish or yellowish white median band. The male genitalia of this species are very similar to those of *T. pantarcha* and their morphological differences will be mentioned in the Diagnosis and Remarks under the next species. Concerning the Vietnamese specimens treated in Park *et al.* (2007), the adult specimen illustrated in pl. 12: 243 and female genitalia in pl. 64: 243 as *T. subocellata* do belong to this species, but the male genitalia in pl. 40: 243 given as *T. subocellata* belong to a species of another genus. Additionally, the adult specimen in pl. 12: 244, male genitalia in pl. 40: 244 and female genitalia in pl. 65: 244 illustrated as *T. palliatrix* by Park *et al.* (2007) are a misidentification and we consider them to belong to *T. subocellata.*

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Targalla pantarcha (Turner, 1922) **stat. rev.** (Figs 25-29, 50, 51, 60)

Phlegetonia pantarcha Turner, 1922: 36. Type locality: Kuranda, near Cairns, North Queensland, Australia.
Targalla subocellata pantarcha: Holloway, 1985: 192.

Male (Figs 25, 26): Forewing length 14.5-16.9 mm. Head: labial palpi reddish brown with black scales and speckled with white; frons reddish brown on dorsal half and white on ventral half; vertex densely covered with reddish brown scales; antenna filiform. Thorax: tegulae brownish gray, sparsely mixed with reddish brown scales; fore-, mid- and hind-legs white, mixed with black and reddish brown scales. Abdomen: gray with fuscous 2nd to 5th or 6th dorsal area with grayish brown ventrally. Forewing: distal half entirely gray; inner area of median band dark gray; basal, subbasal and antemedial line usually dark brown, indistinctly speckled or almost absent; orbicular spot very small, white or almost absent; reniform stigma brownish yellow, sometimes tinged with dark brown, oblong, distorted, upper end pointed and bordered by an indistinctly white part at the inside, slightly concave on the outside with an indistinct dark exterior chevron area; median band pale ashy gray, sometimes tinged with pink, oblique and slightly curved; postmedial line almost absent or represented by a faint, dark brown line and its dorsal half forming a comparatively conspicuous outcurved semicircular line located at subapical portion of costa to vein M2 or M3; subterminal line almost absent or represented by a faint serrate line and its outer area darker than inner area with a dark brown triangular shade subapically; a series of black dots on interspaces of veins marginally; cilia dark gray, often mixed with reddish brown. Hindwing: uniformly dark grayish brown, often tinged with reddish pink, cinereous-white at the base; cilia dark gray, often mixed with reddish brown.

Female (Figs 27-29). Forewing length 13.9-16.4 mm. Similar to male, but reniform stigma with a characteristic exterior dark chevron area at the outside. Hindwing strongly tinged with reddish pink and outer area of forewing sometimes tinged with reddish pink also.

Male genitalia (Figs 50-52). Uncus very small, hooked, sharply flexed; socius rectangular plate-like, with spinules. Tegumen rather thick, smooth, strongly curved in lateral view, with a very long rod-like process at middle part accompanying uncus at apex; vinculum represented by a distorted, tape-like sclerite; saccus long, relatively broad, tongue-like and approximately same length as valva. Valva distorted and rectangular, apex with weakly sclerotized and triangular lobes bending dorsally. Aedeagus elongate, almost same length as valva + saccus; rostellum rather short and slender; vesica multilobed, bearing two conspicuous cornuti (B & D), a plate like cornutus (A) and a densely spiny band (E).

Female genitalia (Fig. 60). Apophyses posteriores weakly sclerotized and moderate in length. Ostium bursae asymmetrical, sclerotized and slightly protruded on left side. Ductus bursae narrow, membranous on posterior half and bulging, sclerotized, squarish, with two patchwise spines on anterior half. Corpus bursae rounded; signum scobinate and slightly curved inside.

Specimens examined. Lectotype (Fig. 29): ♀, Australia, Q., National Park (3,000ft.), III, (CSIRO) here designated. [PHILIPPINES] 2♂, Luzon Is., Mt. St. Tomas, 2,000m, III-IV. 1985, (TMC); 1♂, Luzon Is., Mountain Prov., Mt. Data, alt. 2,250m, 24-26. VII. 1985, M. Owada leg. (NSMT); 1♀, Mindanao Is., Mt. Imbayaw, V. 1991 (TMC); 1♀, Panay Is., Mt. Madjaas, alt. 500m, 23. VII. -5. VIII. 2000, Ramel Cabale leg. (TMC); 1♀, Panay Is., Mt. Balabag, alt. 500m, 23. VIII. -1. IX. 2000, Ramel Cabale leg. (TMC); 1♀, Leyte Is., Mt. Lobi, alt. 600m, 25. X-6. XI. 2000, Ramel Cabale leg. (TMC); 1♀, Leyte Is., Mt. Bolocaue, alt.800m, 25-31. III. 2001, Danny Mohagan leg. (TMC); 2♀, Bohol Is., Mayana, alt. 300m, I. 2001, Ramel Cabale leg. (TMC); 1♀, N. Palawan, Dumaran Is., alt. 300-400m, Beginning of XII. 2005, Domingo Mohagan leg. (TMC); [INDONESIA] (1♀, 30. III. 1985), (1♀, 15. X. 1985), Sulawesi Is., Toraja, Mt. Pedamaran, alt. 1,000m, Kunihiko Sohma leg. (TMC); 1♀, Sulawesi Is., Nr. north border Puncak Dingin, alt. 1,700m, IX-X. 1985, Shinji Nagai leg. (NIAES); 1♀, Sulawesi Is., (Puncak) 32km from Palopo, Luwu, 30. IV. 1994, S. Saito *et al.* leg. (NIAES); 1♂, Sulawesi Is., Sampuraga, Puncak, Pendoro side, 23. VIII. 1994, alt. 1,300m, T. Masui leg. (TMC); 1♂2♀, W. Papua, Wamena, Pass-valley, alt. ±2,000m, L. T., VII-VIII. 1997 (TMC).

Distribution. PHILIPPINES (new record: Luzon Is., Panay Is., Leyte Is., Bohol Is., Mindanao Is., Palawan Is.), INDONESIA (Sulawesi Is., New Guinea Is.) and Australia (Queensland: HQ951346, HQ951347, HQ951348).

Diagnosis and Remarks. Holloway (1985) considered *T. subocellata* as a distinct species distributed in N. E. Himalaya, S. E. Asia, Philippines, Sulawesi, S. Moluccas, New Guinea and Queensland. He recognized two subspecies as follows; *T. subocellata subocellata* from N. E. Himalaya, S. E. Asia, Philippines and *T. subocellata pantarcha* from Sulawesi, S. Mollucas, New Guinea, Queensland. He mentioned *T. subocellata pantarcha* as differing from *T. subocellata subocellata* in that in the former subspecies the forewing is much grayer and the

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zone from the median to the postmedial line is pale ashy gray with no tinge of orange, while in contrast the zone is yellowish suffused with orange in the latter subspecies. In this study, we discovered *T. subocellata pantarcha sensu* Holloway (1985) from the Philippines (Luzon Is., Palawan Is., Panay Is., Mindanao Is.). This fact means that the distributions of the two subspecies overlap. Therefore, we compared the male and female genitalia of both subspecies carefully. As a result we consider that the two taxa apparently represent two distinct species. Moreover, this fact is also supported by our survey of standard DNA barcoding (*COI*) as shown in Fig. 61. In the male genitalia, *T. pantarcha* bears a plate-like cornutus (A) and cornutus (C) is lacking on the vesica; the ostium bursae of the female genitalia is asymmetrical with a slightly protruded left side.

As mentioned in the Introduction, we give the photographs of the type specimens of three species endemic to Sri Lanka and/or India in South Asia for reference. They are *T. bifacies* (Walker) illustrated in Fig. 30, *T. ludatrix* (Walker) in Fig. 31 and *T. repleta* (Walker) in Fig. 32.

Discussion on male genitalia and DNA barcoding

Availability of eversion of vesica in male genitalia

By the methods shown in Materials and Methods, we could successfully evert the vesica without breaking the cornuti and vesica itself. As a result, the cornuti on the vesica proved to be very important characteristics to distinguish each species of the *delatrix* group precisely.

DNA barcoding

As shown in Fig. 61, we could distinguish *T. delatrix* and its six close species successfully by standard DNA barcoding using the mitochondrial DNA (*COI*) gene. We registered their nucleotide sequences in the DNA Data Bank of Japan (DDBJ) and we show the accession numbers of them in Fig. 61. We recognized several haplotypes in *T. subocellata* and noticed 1.8% average sequence divergences between a Philippine specimen (Panay Is.) (Fig. 23) and Vietnamese plus Laotian specimens, but no morphological differences were observed between them. Therefore, we consider the population of the Philippines and that of Vietnam plus Laos to represent the same species. As mentioned in Diagnosis and Remarks under *T. sugii*, it was impossible to distinguish *T. sugii* and *T. silvicola* sp. nov. externally. However, these two taxa are separable by DNA barcoding and represent different clades in Fig. 61. For *T. silvicola* sp. nov., we recognized three haplotypes, of which one haplotype is identical to "*Targalla subocellata* (HQ006210)" from Hong Kong registered in GenBank and we also identify it as *T. silvicola* sp. nov. Judging from the photographs of three adult specimens of "Lepidoptera sp. (HQ951346-HQ951348)" from Australia registered in Barcode of Life Database (BOLD), we consider them to be *T. pantarcha*, and the clade is highly supported. The barcode data from Australia shown in Fig. 61 were derived from the results of rapid digitization and sequencing of a natural history collection done by Hebert *et al.* (2013). In the same way, we treat an example we collected from Laos (AB915689) and "Lepidoptera sp. (HQ951349)" from Australia registered in BOLD as *T. infida*. Although several haplotypes were recognized, we consider a specimen from Okinawa Is., Japan (AB915690) and four individuals of "Lepidoptera sp. (HQ951350- HQ951353)" from Australia registered in BOLD as *T. delatrix* similarly and the phylogenetic tree strongly suggests monophyly of this species.

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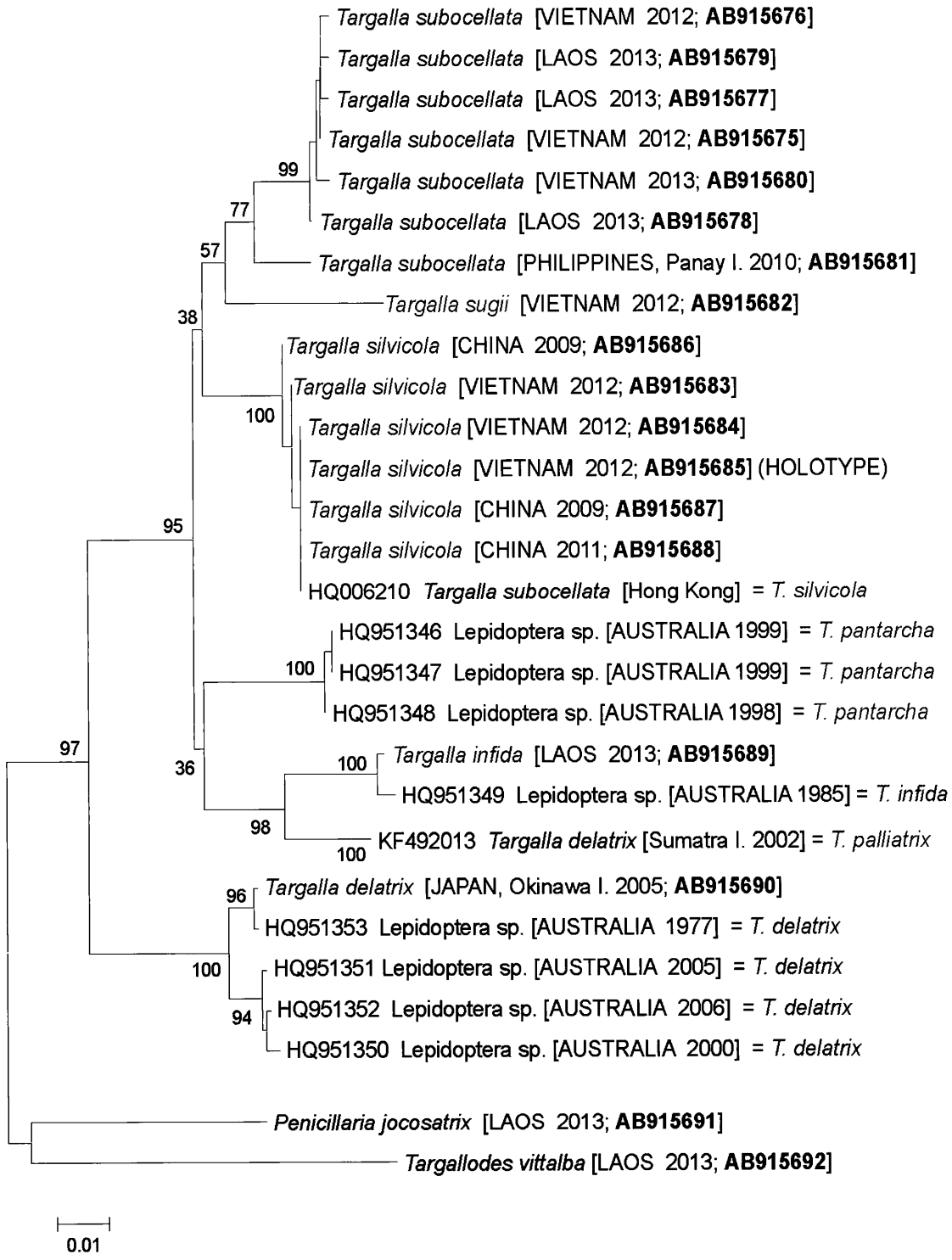
Targalla subocellata [VIETNAM 2012; AB915676]
Targalla subocellata [LAOS 2013; AB915679]
Targalla subocellata [LAOS 2013; AB915677]
Targalla subocellata [VIETNAM 2012; AB915675]
Targalla subocellata [VIETNAM 2013; AB915680]
Targalla subocellata [LAOS 2013; AB915678]
Targalla subocellata [PHILIPPINES, Panay I. 2010; AB915681]
Targalla sugii [VIETNAM 2012; AB915682]
Targalla silvicola [CHINA 2009; AB915686]
Targalla silvicola [VIETNAM 2012; AB915683]
Targalla silvicola [VIETNAM 2012; AB915684]
Targalla silvicola [VIETNAM 2012; AB915685] (HOLOTYPE)
Targalla silvicola [CHINA 2009; AB915687]
Targalla silvicola [CHINA 2011; AB915688]
HQ006210 Targalla subocellata [Hong Kong] = T. silvicola
HQ951346 Lepidoptera sp. [AUSTRALIA 1999] = T. pantarcha
HQ951347 Lepidoptera sp. [AUSTRALIA 1999] = T. pantarcha
HQ951348 Lepidoptera sp. [AUSTRALIA 1998] = T. pantarcha
Targalla infida [LAOS 2013; AB915689]
HQ951349 Lepidoptera sp. [AUSTRALIA 1985] = T. infida
KF492013 Targalla delatrix [Sumatra I. 2002] = T. palliatrix
Targalla delatrix [JAPAN, Okinawa I. 2005; AB915690]
HQ951353 Lepidoptera sp. [AUSTRALIA 1977] = T. delatrix
HQ951351 Lepidoptera sp. [AUSTRALIA 2005] = T. delatrix
HQ951352 Lepidoptera sp. [AUSTRALIA 2006] = T. delatrix
HQ951350 Lepidoptera sp. [AUSTRALIA 2000] = T. delatrix
Penicillaria jocosatrix [LAOS 2013; AB915691]
Targallodes vittalba [LAOS 2013; AB915692]
99
77
57
38
100
95
100
97
36
100
98
100
96
100
94
0.01

Fig. 61. Neighbor-joining tree of *Targalla* spp. based on 616 bp of the mitochondrial *COI* gene. Accession numbers HQ006210, HQ951346-HQ951353 and KF492013 were quoted from GenBank. Two eutelid moths, *Penicillaria jocosatrix* and *Targallodes vittalba*, were used as outgroup species. The bootstrap method was performed with 1,000 replications.

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摘　要

東アジアおよび東南アジア産の*Targalla delatrix* (Euteliidae: フサヤガ科) とその近縁種の分類学的研究（綿引大祐・吉松慎一）

Targalla 属は世界で20種1亜種が知られ，2つのグループとその他未整理の種に分けられており，インドからオーストラリア一円の亜熱帯および熱帯にかけて分布する (Holloway, 1985; Poole, 1989)．寄主植物はフトモモ科とセンダン科で，タイにおいては本属の一種である*T. delatrix* がフトモモやサントールといった果実の害虫として知られている (Kuroko and Lewvanich, 1993; Robinson *et al.*, 2001)．ボルネオ島を中心としたアジア産の標本に基づいた分類学的な研究はHolloway (1985) により実施されたが，日本を含む中国やベトナム，ラオス，タイ，台湾といった他の東アジアおよび東南アジアにおいては分類学的研究が未だ不十分であった．日本産種においても，いわゆるネグロフサヤガには2種が混同されたままとなっていた（岸田, 2011）．

そこで筆者らは，アジアの多数産地から得られた標本に基づいて，*T. delatrix* とその近縁種 (Holloway (1985) の言う1グループ) の分類学的研究を行った．その結果，これまで本グループは8種1亜種とされてきたが，1未記載種を認めるとともに，1亜種の種への格上げと，1種の復活を認め，11種に整理することができた．ただし，今回は東アジアおよび東南アジア産の種を主に扱ったことから，これらの内，南アジアのスリランカおよびインド特産の3種，*T. bifacies, T. ludatrix, T. repleta*については，参考までにロンドン自然史博物館に所蔵されているタイプ標本の写真を示すに留めた。また，雄交尾器のvesicaを反転させ，これまで本属においてあまり検討されてこなかったvesicaとvesica上の刺であるcornutiを観察したところ，これらは種の識別に有効な形質であることが判明した．これらの形態学的な検討に加え，主にベトナム（2012年6月）とラオス（2013年5-6月）の調査で我々自ら採集した標本ならびにGenBank, BOLDに登録済みのオーストラリア, スマトラ, 香港の塩基配列データと成虫画像データを用いて，外見での識別が比較的難しい東アジアおよび東南アジア産7種の*mt*DNA (*COI*)バーコード領域に基づく分子分類学的な検討も行った．その結果，それぞれの種毎にクレードを形成し，標準的なDNAバーコーディングを用いた同定が本グループにおいても有効であることが示された (Fig. 61)．なお，日本産蛾類標準図鑑Ⅱ（岸田, 2011）によると*Targalla*属はヤガ科フサヤガ亜科に含められているが，最近の分子生物学的な研究により，本亜科を独立の科として扱うことが提唱されており (Zahiri *et al.*, 2011)，今回はその扱いに従い，フサヤガ科とした．以下に日本に生息する2種の簡単な説明を示す．

Targalla delatrix (Guenée, 1852) ネグロフサヤガ（Figs 7, 8, 35, 36, 54）

前翅長：♂11.4-13.4mm, ♀12.0-14.4mm．　前翅は全体的に茶褐色で，かなり黒化する個体も多い．本グループの中では最も小型で，各横線が不明瞭．他種で見られるような外横線上端の半円形の線が，本種ではほとんど現れないことが特徴．分布：インド～オーストラリア地域の熱帯・亜熱帯地域．ラパ島やハワイ島といった太平洋の島嶼においても記録がある広域分布種．日本国内においては，沖縄（沖縄本島・西表島）の標本を筆者らは確認している．

Targalla silvicola Watabiki & Yoshimatsu, sp. nov. マルモンネグロフサヤガ（新称）（Figs 17-20, 44-46, 58）

前翅長：♂12.9-15.3mm, ♀13.4-14.9mm．　前翅の色調および斑紋は変異に富む．日本には前種と本種の*Targalla*属2種が分布しているが，本種は前種と比較して大型で，外横線上端の半円形の線が明瞭に現れることによって識別できる．日本産蛾類標準図鑑Ⅱ（岸田, 2011）でネグロフサヤガ*T. delatrix*として示されている個体のうち，図版2-062-34の個体は本種である．また，日本産蛾類大図鑑（杉，1982）でネグロフサヤガ*Phlegetonia delatrix*として示されている個体のうち，Plate 193, Fig. 9（屋久島産）の個体（本論文中のFig. 18）は本種で，Fig. 10（ボルネオ島産）は Holloway (1985) が述べているように*T. palliatrix*である．なお，*T. palliatrix*は日本には産しない．分布：中国・ラオス・ベトナム・台湾・日本．日本においては，本州（石川県）・九州（福岡県・屋久島・奄美大島）・沖縄本島の標本を筆者らは確認した. 屋久島で比較的多くの個体が得られている．

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